Learning Objectives

You’ll be able to:

- Apply the laws of thermodynamics to HVAC systems.
- Calculate costs and savings of geothermal systems.
- Evaluate topography and measure soil conductivity.
- Determine loop types, including open loops and vertical and horizontal closed loops.
- Choose system components, including heat pumps, water pumps, and piping.
- Learn about routine maintenance on geothermal systems.

Understand earth loop systems
Identify the environmental and economic benefits of geothermal systems
Learn how to make heat loss calculations
Explore vertical and horizontal closed loop systems
Learn about designing forced air and hydronic systems
Discuss how to maintain geothermal systems

Agenda

Presented by Jay Egg

Applying the Laws of Thermodynamics to Geothermal Heat Pumps (GHPs) and Indoor Thermal Comfort
Applying the laws of thermodynamics to HVAC systems
Understanding the refrigeration cycle
Calculating heating and cooling loads
The effect of air flow and insulation
How comfort is measured
Understanding efficiency

Understanding Earth Loop Systems
The hidden assets of geothermal technologies
Solar energy in the Earth
Architecture of closed loop systems
- Horizontal ground loops
- Direct exchange systems
- Mini-grids
Applications for open loop (Class V Thermal Exchange) systems
- Single well
- Two well systems
Evaluating topography
Measuring soil conductivity
Environments for ground-loop systems: beneath yards, fields, parking lots, and buildings

Designing Geothermal Systems
Determining loop type
Making heat loss calculations
Sizing the unit
Sizing the loop
Writing a request for proposal (RFP)
Writing a driller specification
HS2 hydronic design software

Choosing System Type
Distributed GHPs or chiller plants
Basic components of geothermal heat pump (GHP) systems:
- Pumps, condenser water piping, heat pump, heat exchanger
- Forced air systems
- Hydronic systems
- Domestic hot water options
- Geothermal swimming pool heaters

Evaluating the Benefits of Geothermal Systems
Incentives to use geothermal
Geothermal utilities
Measuring performance
Calculating savings and cost
Environmental benefits
Tax credits, incentives and rebates
Property Assessed Clean Energy (PACE)
State-based legislation

Maintaining Geothermal Systems
Performing routine maintenance on GHPs
Loop maintenance (automatic or periodic)
Pump maintenance/monitoring

Geothermal Heating and Cooling: Technology and Applications
St. Louis, MO - Wednesday, May 29, 2019

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Continuing Education Credits
Professional Engineers
6.5 PDHs

Architects
6.5 HSW CEUs/CE Hours
6.5 AIA HSW Learning Units

Contractors
Non-Credit Continuing Ed.
**Faculty**

**Jay Egg** Founder and Consultant with Egg Geothermal

Mr. Egg founded Egg Geothermal in 1990 to provide renewable energy systems to the public. As a result of the American Recovery and Reinvestment Act of 2009, Mr. Egg wrote two books for McGraw-Hill Education, and Egg Geothermal entered into a new age of acceptance. Mr. Egg currently focuses his professional efforts as a renewable energy expert on renewable and sustainable energy, and on solar and geothermal exchange implementation. Among his clients are international, federal, state and local governments; developers; associations; and private entities. Egg Geothermal is a training and curriculum facilitator for the U.S. Department of Energy (DOE) and the “Geothermal Workshop Series,” serving the GeoExchange Organization/ American Ground Water Trust and the National Ground Water Association.

Here’s what past attendees had to say about the program and instructor Jay Egg:

> “Very effective presenter with first hand knowledge of his subject.” – Professional Engineer

> “Great examples of creative applications of the technology.” – Engineer

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**Seminar Information**

**Holiday Inn Forest Park**
5915 Wilson Avenue
St. Louis, MO 63110
(314) 645-0700

<table>
<thead>
<tr>
<th>Registration</th>
<th>Lunch (On your own)</th>
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</thead>
<tbody>
<tr>
<td>8:00 - 8:30 am</td>
<td>12:30 - 1:30 pm</td>
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<tr>
<td>Morning Session</td>
<td>Afternoon Session</td>
</tr>
<tr>
<td>8:30 am - 12:30 pm</td>
<td>1:30 - 4:30 pm</td>
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**Tuition**

- $289 for individual registration
- $269 for three or more simultaneous registrations.

**Included with your registration:**

Complimentary continental breakfast and printed seminar manual.

**Receive a reduced tuition rate of $100** by registering to be our on-site coordinator for the day. For availability and job description, please visit www.halfmoonseminars.org.

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**How to Register**

- Visit us online at www.halfmoonseminars.org
- Mail-in or fax the attached form to 715-835-6066
- Call customer service at 715-835-5900

**Cancellations:** Cancel at least 48 hours before the start of the seminar, and receive a full tuition refund, minus a $39 service charge for each registrant. Cancellations within 48 hours will receive a credit toward another seminar or the self-study package. You may also send another person to take your place.

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**Tuition**

| ( ) I will be attending the live seminar. Single Registrant - $289.00 | Three or more registrants from the same company registering at the same time - $269.00 each |
| ( ) I am not attending. Please send me the self-study package: | Downloadable MP3 Audio/PDF Manual for $269.00 |
| ( ) CD/Manual Package for $289.00 | (A/V included. Please allow five weeks from seminar date for delivery) |

**Checks:** Make payable to HalfMoon Education Inc.

**Credit Card:** Mastercard, Visa, American Express, or Discover

Credit Card Number: ____________________________
Expiration Date: ______/______
CVV2 Code: ____________
Cardholder Name: ______________________________
Billing Address: _______________________________
City: ____________________ State: ___________ Zip: ___________
Signature: ________________
Email: ____________________

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**Additional Learning**

**Webinar Series**

**Solar Photovoltaic Project Design and Development**
- Solar Photovoltaic Project Design and Development, Part I
  - Wed., May 1, 2019, 11:00 AM - 2:30 PM PDT
- Solar Photovoltaic Project Design and Development, Part II
  - Thurs., May 2, 2019, 11:00 AM - 2:30 PM PDT

**Passive House: Planning and Design**
- Energy Efficiency of Conventional Construction
  - Thurs., May 9, 2019, 11:00 AM - 12:00 PM PDT
- Passive House Standard: Purpose, Principles and Development
  - Thurs., May 9, 2019, 12:30 - 2:00 PM PDT
- Architectural Elements of Passive Houses
  - Fri., May 10, 2019, 11:00 AM - 12:30 PM PDT
- Mechanical Systems in Passive Houses
  - Fri., May 10, 2019, 1:00 - 2:30 PM PDT

**Erosion and Sediment Control**
- Soils and Causes of Erosion
  - Thurs., May 16, 2019, 11:00 AM - 12:00 PM PDT
- Goals for Selection of Erosion and Sediment Control Practices
  - Thurs., May 16, 2019, 12:30 - 1:30 PM PDT
- Calculations for Determining Soil Loss and Channel Stabilization
  - Fri., May 17, 2019, 11:00 AM - 12:00 PM PDT
- Non-Structural Erosion and Sediment Control Best Practices
  - Fri., May 17, 2019, 12:30 - 1:30 PM PDT

For more information and other online learning opportunities visit: www.halfmoonseminars.org/webinars/

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**Continuing Education Credit Information**

This seminar is open to the public and offers 6.5 PDHs to engineers and 6.5 HSW CEUs to continuing education hours to architects in most states. Educaters and courses are not subject to preapproval in Missouri.

This seminar is approved by the American Institute of Architects for 6.5 HSW Learning Units (Provider No. 11885). Only full attendance can be reported to the AIA/CES.

HalfMoon Education is an approved continuing education sponsor for engineers in Florida, Indiana (License No. CE1700059), Maryland, New Jersey (Approval No. 24G100000700), North Carolina, and North Dakota. HalfMoon Education is deemed an approved continuing education sponsor for New York architects.

This course offers a non-credit continuing education opportunity to construction contractors. It has not been approved by any state contractor licensing entity for mandatory continuing education credit.

Attendance will be monitored and attendance certificates will be available after the seminar for most individuals who complete the entire event. Attendance certificates not available at the seminar will be mailed to participants within fifteen business days.

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**Can't Attend? Order the Manual and Audio from the Live Seminar as a Self-Study Package!**

Audio recordings of this seminar are available for purchase starting at $269. See registration panel for more information and please refer to specific state licensing rules or certification requirements to determine if this learning method is eligible for continuing education credit.